What Is Claimed Is:

Claim 1. A solid-state scanning microscope, comprising:

a source of collimated radiant energy for illuminating a sample, the sample having a first side and a second side, the radiant energy illuminating the first side of the sample;

a plurality of narrow angle filters comprising a microchannel structure to permit the passage of only unscattered radiant energy through the microchannels, the microchannel structure having a first end and a second end, the first end of the microchannel structure placed near the second side of the sample on the side opposite the source of radiant energy, some portion of the radiant energy entering the microchannels from the sample;

a solid-state sensing array comprising a plurality of sensing elements attached to the second end of the microchannel structure, the sensing elements being sensitive to radiant energy, a plurality of the microchannels being aligned each to correspond with an individual sensing element of the solid-state sensing array,

wherein that portion of the radiant energy entering the microchannels that is parallel to the microchannel walls travels to the corresponding sensing elements generating electrical signals that can enable an image to be reconstructed by an external device; and

a planar luminescent material layer for converting higher frequency radiant energy into a detectable range for the solid-state sensing elements, the luminescent material layer being inserted between the solid-state sensing array and the second end of the microchannel structure.

Claim 2. A system as in one of Claim 1,

wherein the radiant energy is X-Ray radiation.

Claim 3. A solid-state scanning microscope, comprising:

a source of collimated radiant energy;

a plurality of narrow angle filters comprising a microchannel structure to permit the passage of only unscattered radiant energy through the microchannels, the

microchannel structure having a first end and a second end;

a solid-state sensing array comprising a plurality of sensing elements, attached at the first end of the microchannel structure, the sensing elements being sensitive to radiant energy, a plurality of the microchannels being aligned each to correspond with an individual sensor element of the solid-state sensing array;

a planar member of an optically conductive material suitable for conducting radiant energy, the planar member having a first side and a second side, the first side of the planar member being placed perpendicular to the second end of the microchannel structure and attached to the microchannel structure allowing for an air-gap between the planar member and the microchannel structure;

an index matching fluid placed adjacent to the second side of the planar member, the index matching fluid being matched to the index of the planar member, the index matching fluid continuously filling the region between the surface of the sample and the second side of the planar member; and

a prism placed upon the planar member so as to conduct the source of radiant energy operatively into the planar member, the radiant energy being reflected by the first side and not reflected by the second side of the planar member, the radiant energy escaping the second side of the planar member to illuminate the surface of the sample, some portion of the radiant energy being reflected by the sample to enter the microchannels, that portion of the radiant energy entering the microchannels that is parallel to the microchannel walls travels to the solid-state sensing elements to generate electrical signals that can enable an image to be reconstructed by an external device.

Claim 4. The solid-state scanning microscope of Claim 3, wherein the radiant energy is laser light radiation.

Claim 5. The solid-state scanning microscope of Claim 3, wherein the radiant energy is visible light radiation.

Claim 6. The solid-state scanning microscope of Claim 3, wherein the source of radiant energy is a solid-state emitter.

Claim 7. A solid-state microscope, comprising:

a plurality of narrow angle filters comprising a microchannel structure to permit the passage of only unscattered radiant energy through the microchannels, the microchannel structure having a first end and a second end;

a solid-state sensing array comprising a plurality of sensing elements, attached at the first end of the microchannel structure, a plurality of the microchannels being aligned each to correspond with an individual sensing element of the sensing array;

a plurality of solid-state emitters for emitting radiant energy mounted on the second end of the microchannel structure, the emitters illuminating the surface of a sample, some portion of the radiant energy being reflected by the sample to enter the microchannels, that portion of the radiant energy entering the microchannels that is parallel to the microchannel walls travels to the sensing elements to generate electrical signals that can enable an image to be reconstructed by an external device; and

a transparent planar member adjacent to the second end of the microchannel structure, the transparent covering containing conduction paths to conduct power to the solid-state emitters, the transparent cover protecting the second end of the microchannel structure from damage and preventing the entrance of foreign objects into the microchannels.

Claim 8. The solid-state scanning microscope of Claim 7,

wherein the solid-state emitters are Light Emitting Diodes.

Claim 9. The solid-state scanning microscope of Claim 7,

wherein the solid-state emitters are Light Emitting Polymers.

Claim 10. A solid-state microscope, comprising:

a source of collimated radiant energy;

a narrow angle filter comprising a microchannel to permit the passage of only unscattered radiant energy through the microchannel, the microchannel having a first end and a second end;

a solid-state sensing element, attached at the first end of the microchannel, the microchannel being aligned with the sensing element; and

a polarizing beam splitting element having a partially reflective inner surface, the polarizing beam splitting element being inserted between the second end of the microchannel and a sample, the polarizing beam splitting element having a first side, a second side, and a third side, the first side being attached to the second end of the microchannel,

wherein the second side of the polarizing beam splitting element is perpendicular to the sample and receives the collimated radiant energy, the third side being adjacent to the sample and directing a portion of the internally reflected collimated radiant energy to the sample and receiving some portion of the radiant energy reflected by the sample, the third side being opposite the first side, the first side directing some portion of the sample reflected radiant energy to enter the microchannel, some portion of the radiant energy being reflected by the sample to enter the microchannel, that portion of the radiant energy entering the microchannel that is parallel to the microchannel walls travels to the sensing element to generate an electrical signal that can enable an image to be reconstructed by an external device.

Claim 11. The solid-state scanning microscope of Claim 10,

wherein the radiant energy is laser light radiation.

Claim 12. The solid-state scanning microscope of Claim 10,

wherein the radiant energy is visible light radiation.

Claim 13. The solid-state scanning microscope of Claim 10,

wherein the source of radiant energy is a solid-state emitter.

Claim 14. A solid-state microscope, comprising:

a source of collimated radiant energy, the source of collimated radiant energy being X-Ray radiation;

a narrow angle filter comprising a microchannel to permit the passage of only unscattered radiant energy through the microchannel, the microchannel having a first end and a second end;

a solid-state sensing element, attached at the first end of the microchannel, the

microchannel being aligned with the sensing element;

a planar luminescent material layer for converting higher frequency radiant energy into a detectable range for the solid-state sensing elements, the luminescent material layer being inserted between the solid-state sensing array and the first end of the microchannel structure;

a beam splitting element having a partially reflective inner surface, the polarizing beam splitting element being inserted between the second end of the microchannel and a sample, the beam splitting element having a first side, a second side, and a third side, the first side being attached to the second end of the microchannel,

wherein the second side of the beam splitting element is perpendicular to the sample and receives the collimated radiant energy, the third side being adjacent to the sample and directing a portion of the internally reflected collimated radiant energy to the sample and receiving some portion of the radiant energy reflected by the sample, the third side being opposite the first side, the first side directing some portion of the sample reflected radiant energy to enter the microchannel, some portion of the radiant energy being reflected by the sample to enter the microchannel, that portion of the radiant energy entering the microchannel that is parallel to the microchannel walls travels to the sensing element to generate an electrical signal that can enable an image to be reconstructed by an external device; and

a waveguide for conducting the source of radiant energy to the second side of the beam splitter.

Claim 15. A solid-state microscope, comprising:

a scanning stage for providing structural support for moving the microscope, the scanning stage having a first side and a second side;

a solid-state emitter for radiating energy, the emitter having a first side and a second side, the first side of the emitter radiating energy, the second side of the emitter mounted to the first side of the scanning stage;

a waveguide having a first end, a second end, and an internally reflective surface, the first end of the waveguide being attached to the second side of the solid

state emitter allowing radiant energy from the solid-state emitter to enter into the waveguide to be reflected by the internally reflective surface, the reflected radiant energy exiting at the second end of the waveguide;

a narrow angle filter comprising a microchannel to permit the passage of only unscattered radiant energy through the microchannel, the microchannel having a first end and a second end;

a beam splitting element adjacent to the second end of the waveguide and near a sample, the beam splitting element having a first side, a second side, and a third side,

wherein the first side of the beam splitting element is perpendicular to the sample and receives the reflected radiant energy from the waveguide and conducts the radiant energy to exit the second side of the beam splitting element, the second side of the beam splitting element being adjacent to a sample and directing a portion of the radiant energy to the sample and receiving some portion of the radiant energy reflected by the sample, the third side of the beam splitting element being opposite the second side of the beam splitting element and adjacent to the second end of the microchannels, the third side of the beam splitting element directing some portion of the reflected radiant energy to enter the microchannels, some portion of the radiant energy being reflected by the sample to enter the microchannel; and

a solid-state sensing element having a first side and a second side, the sensing element detecting radiant energy from the first side, the second side of the sensing element mounted to the first side of the scanning stage adjacent to the solid state emitter,

wherein that portion of the radiant energy entering the microchannel that is parallel to the microchannel walls travels to the sensing element to generate an electrical signal that can enable an image to be reconstructed by an external device.

Claim 16. The solid-state microscope of Claim 15,

wherein the beam splitting element has a polarizing filter.

Claim 17. A color solid-state scanning microscope, comprising:

a scanning stage for providing structural support for moving the microscope, the scanning stage having a first side and a second side;

a plurality of solid-state emitters for radiating energy, the wavelength of radiant energy of a predetermined number solid-state emitters is of at least two substantially different wavelengths, each emitter having a first side and a second side, the first side of each emitter radiates energy, the second side of each emitter is mounted to the first side of the scanning stage;

a plurality of waveguides, each waveguide having a first end, a second end, and an internally reflective surface, the first end of each waveguide being attached to the second side of a solid state emitter allowing radiant energy from the solid-state emitter to enter into the waveguide to be reflected by the internally reflective surface, the reflected radiant energy exiting at the second end of the waveguide;

a plurality of narrow angle filters comprising a microchannel structure to permit the passage of only unscattered radiant energy through the microchannel, the microchannel having a first end and a second end;

a plurality of beam splitting elements, each beam splitting element adjacent to the second end of the waveguide and near a sample, the beam splitting elements each having a first side, a second side, and a third side,

wherein the first side of each beam splitting element is perpendicular to the sample and receives the reflected radiant energy from the waveguide and conducts the radiant energy to exit the second side of the beam splitting element, the second side of the beam splitting element being adjacent to a sample and directing a portion of the radiant energy to the sample and receiving some portion of the radiant energy reflected by the sample, the third side of the beam splitting element being opposite the second side of the beam splitting element and adjacent to the second end of the microchannels, the third side of the beam splitting element directing some portion of the reflected radiant energy to enter the microchannels, some portion of the radiant energy being reflected by the sample to enter the microchannel; and

a plurality of solid-state sensing elements, each solid-state sensing element having a first side and a second side, the sensing element detecting radiant energy from the first side, the second side of the sensing element mounted to the first side of the scanning stage adjacent to the solid state emitter,

wherein that portion of the radiant energy entering the microchannel that

is parallel to the microchannel walls travels to the sensing element to generate an electrical signal that can enable an image to be reconstructed by an external device.

Claim 18. The color solid-state scanning microscope of Claim 17,

wherein a predetermined number of beam splitting elements have a polarizing filter.

Claim 19. A method of scanning an array of sensing devices over a sample, comprising the steps of:

applying an array of sensing devices to a sample, the array of sensing devices being composed of individual sensing elements arranged in a fixed pattern relative to each other;

rotating the array of sensing devices a predetermined amount about an axis perpendicular to the plane containing the array of sensing devices; and

traversing a linear scan path over the sample with the array of sensing devices, the individual sensing elements tracing parallel paths, the distance between the parallel paths being determined by the rotation of the array of sensing devices and the relative position of the individual sensing devices in the array, the parallel paths being non-overlapping, partially overlapping, or completely overlapping other parallel paths.

Claim 20. The method of Claim 19,

wherein the array of sensing devices is a 1-dimensional, linear array.

Claim 21. The method of Claim 19,

wherein the array of sensing devices is a 2-dimensional, planar array.